

# Library Description



## **ColourConverter\_01.lib** Library for Converting Color Formats

Version 1.0.2

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## Number Notation

Table 1: Number Notation





Number Code	Example	Comment
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated by a period

## Font Conventions

Table 2: Font Conventions

Font Type	Explanation
<i>italic</i>	Names of paths and files are displayed in italics, e.g.: <i>C:\Programs\WAGO-I/O-CHECK</i>
<b>Menu</b>	Menu options are displayed in bold, e.g.: <b>Save</b>
>	A “greater than” symbol between two names denotes the selection of a menu option from a menu, e.g.: <b>File &gt; New</b>
<b>Input</b>	Designation of input or optional fields are displayed in bold, e.g.: <b>Start of measurement range</b>
“Value”	Input or selection values are displayed in quotation marks, e.g.: Enter the value “4 mA” under <b>Start of measurement range.</b>
<b>[Button]</b>	Button labels within the dialogs are bold and enclosed in square brackets, e.g.: <b>[Input]</b>
<b>[Key]</b>	Key labels on the keyboard are displayed in bold and enclosed in square brackets, e.g.: <b>[F5]</b>

## Symbols

<b>DANGER</b>	<b>Warning against personal injury!</b>
	Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.
<b>DANGER</b>	<b>Do not work on components while energized!</b>
	Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.
<b>WARNING</b>	<b>Warning against personal injury!</b>
	Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.
<b>CAUTION</b>	<b>Warning against personal injury!</b>
	Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
<b>NOTICE</b>	<b>Warning: Damage to property!</b>
	Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.
<b>ESD (Electrostatic Discharge)</b>	<b>Warning: Damage to property caused by electrostatic discharge (ESD)!</b>
	Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.
<b>Note</b>	<b>Important note!</b>
	Indicates a potential malfunction which will not result in damage to property, however, if not avoided.
<b>Information</b>	<b>Additional Information</b>
	Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

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Moreover, the persons cited here must also be familiar with all of the products cited in this document, along with the operating instructions. They must also be capable of correctly predicting any hazards which may not arise until the products are combined.

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The sample applications described in this documentation represent concepts, that is, technically feasible applications. Whether these concepts can actually be implemented depends on various guidelines. For example, different versions of the hardware or software components can require different handling than that described here. Therefore, the descriptions contained in this documentation do not form the basis for assertion of a certain product characteristic.

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# Table of Contents

<b>1</b>	<b>Light Effects</b> .....	<b>8</b>
1.1	Color Mixer (FbColourMixer) .....	8
1.2	Save Color Palette (FbSaveColourPalette) .....	10
1.3	Recall Color Palette (FbRecallColourPalette) .....	12
1.4	Periodic Light Scene (FbFadeGenerator).....	14
1.5	Cross Fade Sequence (FbColourCrossFader) .....	16
1.6	Chaser (FbChaser).....	18
<b>2</b>	<b>Color Space</b> .....	<b>20</b>
2.1	RGB in Yxy Color Space (CIE 1931) (FuRGB_TO_Yxy) .....	20
2.2	Yxy Color Space (CIE 1931) to RGB (FuYxy_TO_RGB) .....	21
2.3	RGB to CIE XYZ Color Space (FuRGB_TO_XYZ) .....	22
2.4	CIE XYZ Color Space to RGB (FuXYZ_TO_RGB) .....	23
2.5	CIE XYZ to Yxy Color Space (CIE 1931) (FuXYZ_TO_Yxy).....	24
2.6	Yxy (CIE 1931) to CIE XYZ Color Space (FuYxy_TO_XYZ).....	25
2.7	RGB to CODESYS Color Format (FuRGB_TO_COLOUR).....	26
2.8	CODESYS Color Format to RGB (FuCOLOUR_TO_RGB).....	27
<b>3</b>	<b>General Functions</b> .....	<b>28</b>
3.1	Value Input typRGB (FuTypRGB).....	28
3.2	Value Input typXYZ (FuTypXYZ).....	29
3.3	Value Input typYxy (FuTypYxy).....	30
<b>4</b>	<b>Color Temperature</b> .....	<b>31</b>
4.1	RGB to Color Temperature (FuRGB_TO_TEMP).....	31
4.2	Color Temperature to RGB (FuTEMP_TO_RGB).....	32
<b>5</b>	<b>Color Format</b> .....	<b>33</b>
5.1	RGB to CODESYS Color Format (FuRGB_TO_COLOUR).....	33
5.2	CODESYS Color Format to RGB (FuCOLOUR_TO_RGB).....	34
5.3	RGB to HTML Color Format (FuRGB_TO_HTML_COLOUR) .....	35
5.4	HTML Color Format to RGB (FuHTML_COLOUR_TO_RGB) .....	36
<b>6</b>	<b>CCT Control</b> .....	<b>37</b>
6.1	Correlated Color Temperature Control (FbCCT_control) .....	37
<b>7</b>	<b>Data Types</b> .....	<b>38</b>
7.1	RGB Color Space (typRGB).....	38
7.2	CIE Yxy Coordinates (typYxy) .....	38
7.3	CIE XYZ Coordinates (typXYZ).....	39
<b>8</b>	<b>Appendix</b> .....	<b>40</b>
8.1	Color Temperature and Dimming Values (typWarmCoolWhite).....	40



# 1 Light Effects

## 1.1 Color Mixer (FbColourMixer)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbColourMixer	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Value "Red"
bGreen	BYTE	Value "Green"
bBlue	BYTE	Value "Blue"
xWrite	BOOL	A rising edge writes the entered values to the corresponding typRGB.
xAutoWrite	BOOL	Values are refreshed automatically.
<b>Input/Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
typRGB	<a href="#">typRGB</a>	Data structure of a color in the RGB color space
<b>Input / Output Parameters:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD-	Color in CODESYS format 16#BBGGRR
<b>Graphical Illustration:</b>		



**Function Description:**

The **FbColourMixer** function block is used for setting the color of an RGB light. The respective color components are specified by the **"bRed"**, **"bGreen"** and **"bBlue"** inputs.

The values are transmitted to **"typRGB"** by a rising edge at the **"xWrite"** input.

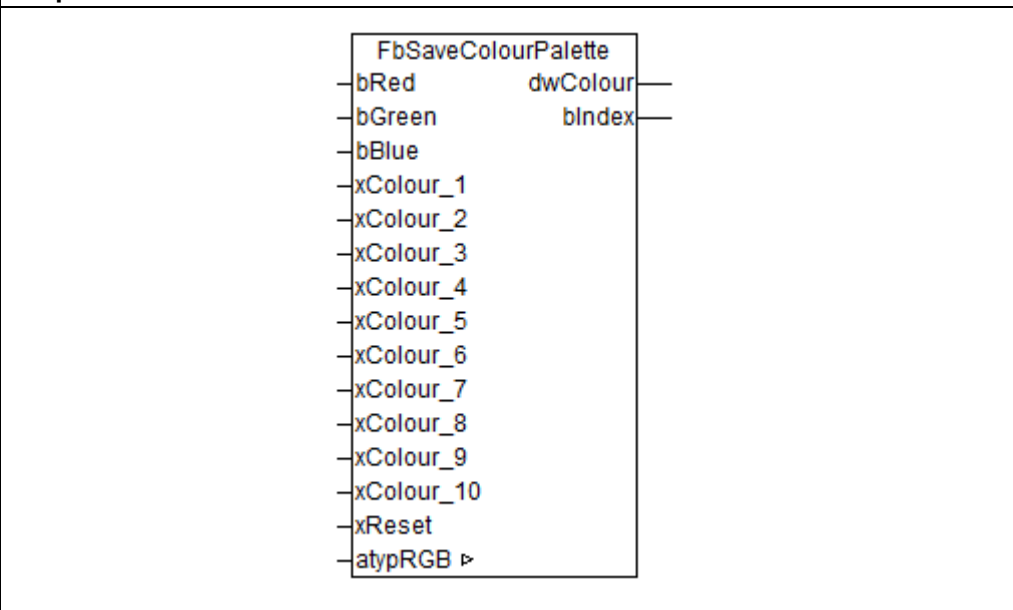
If the **"xAutoWrite"** input variable is set to TRUE, the inputs **"bRed"**, **"bGreen"** and **"bBlue"** are monitored for value shifting. As soon as a value changes, it is transmitted to **"typRGB"**.

The color is displayed at the **"dwColour"** output. Representation is as a hexadecimal character in the order B (Blue) G (Green) R (Red). Yellow, for example, in this form has the value 16#00FFFF and white the value 16#FFFFFF.

## 1.2 Save Color Palette (FbSaveColourPalette)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbSaveColourPalette	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Value "Red"
bGreen	BYTE	Value "Green"
bBlue	BYTE	Value "Blue"
xColour_1	BOOL	A rising edge will result in the color palette being saved in atypRGB[1].
xColour_2	BOOL	A rising edge will result in the color palette being saved in atypRGB[2].
xColour_3	BOOL	A rising edge will result in the color palette being saved in atypRGB[3].
xColour_4	BOOL	A rising edge will result in the color palette being saved in atypRGB[4].
xColour_5	BOOL	A rising edge will result in the color palette being saved in atypRGB[5].
xColour_6	BOOL	A rising edge will result in the color palette being saved in atypRGB[6].
xColour_7	BOOL	A rising edge will result in the color palette being saved in atypRGB[7].
xColour_8	BOOL	A rising edge will result in the color palette being saved in atypRGB[8].
xColour_9	BOOL	A rising edge will result in the color palette being saved in atypRGB[9].
xColour_10	BOOL	A rising edge will result in the color palette being saved in atypRGB[10].
xReset	BOOL	A rising edge will result in the entire contents of the atypRGB array being cleared.
<b>Input/Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
atypRGB	ARRAY [1..10] of <a href="#">typRGB</a>	Color palette array.
<b>Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD-	Color in CODESYS format 16#BBGGRR
bIndex	BYTE-	Current color index

**Graphical Illustration:**



**Function Description:**

Ten (10) color palettes can be stored using the **FbSaveColourPalette** function block.

The respective color palette can be configured via the **"bRed"**, **"bGreen"** and **"bBlue"** inputs.

At a rising edge at the **"xColour\_1"** to **"xColour\_10"** inputs, the color palette is saved in the corresponding element of the **"atypRGB"** array.

Using a rising edge at the **"xReset"** input, the contents of the **"atypRGB"** array can be deleted.

The color is displayed at the **"dwColour"** output. Representation is as a hexadecimal character in the order B (Blue) G (Green) R (Red). Yellow, for example, in this form has the value 16#00FFFF and white the value 16#FFFFFF.

The current color index is displayed at the **"bIndex"** output.

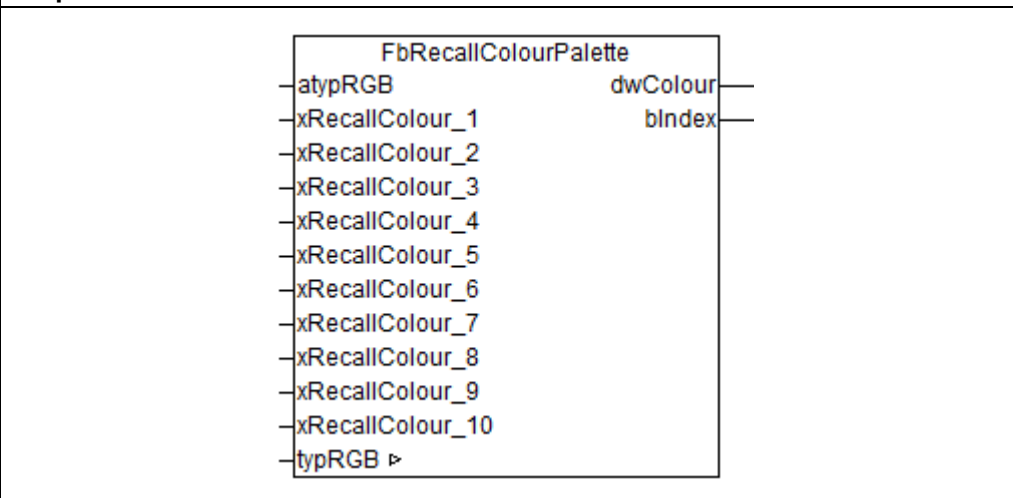
**Note:**

- The variables at the **"atypRGB"** input should be declared as **RETAIN PERSISTENT** so that the list of color palettes is retained after a controller reset and after a download.

## 1.3 Recall Color Palette (FbRecallColourPalette)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbRecallColourPalette	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
atypRGB	ARRAY [1..10] of <a href="#">typRGB</a>	Color palette array.
xRecallColour_1	BOOL	A rising edge will result in the color palette being called up from atypRGB[1].
xRecallColour_2	BOOL	A rising edge will result in the color palette being called up from atypRGB[2].
xRecallColour_3	BOOL	A rising edge will result in the color palette being called up from atypRGB[3].
xRecallColour_4	BOOL	A rising edge will result in the color palette being called up from atypRGB[4].
xRecallColour_5	BOOL	A rising edge will result in the color palette being called up from atypRGB[5].
xRecallColour_6	BOOL	A rising edge will result in the color palette being called up from atypRGB[6].
xRecallColour_7	BOOL	A rising edge will result in the color palette being called up from atypRGB[7].
xRecallColour_8	BOOL	A rising edge will result in the color palette being called up from atypRGB[8].
xRecallColour_9	BOOL	A rising edge will result in the color palette being called up from atypRGB[9].
xRecallColour_10	BOOL	A rising edge will result in the color palette being called up from atypRGB[10].
<b>Input/Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
typRGB	<a href="#">typRGB</a>	Data structure of a color in the RGB color space
<b>Input / Output Parameters:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD-	Color in CODESYS format 16#BBGRR
bIndex	BYTE-	Current color index

**Graphical Illustration:**



**Function Description:**

Using the **FbRecallColourPalette** function block, stored color palettes can be called from the **"atypRGB"** array.

The **"atypRGB"** input can be linked with the variables of the same name of the **FbSaveColourPalette** function block and contains the stored color palettes.

At a rising edge at the **"xRecallColour\_1"** to **"xRecallColour\_10"** inputs, the color palettes are called up from the corresponding element of the **"atypRGB"** array.

The color is displayed at the **"dwColour"** output. Representation is as a hexadecimal character in the order B (Blue) G (Green) R (Red). Yellow, for example, in this form has the value 16#00FFFF and white the value 16#FFFFFF.

The current color index is displayed at the **"bIndex"** output.

## 1.4 Periodic Light Scene (FbFadeGenerator)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbFadeGenerator	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
xEnable	BOOL	Activation of the fade sequence
tPeriod	TIME	(Cycle duration) Minimum: 1 s Default setting: 5 s
bMaximumValue	BYTE	Maximum value Default setting: 255
xTriangle	BOOL	Triangle function Default setting = TRUE
xSquare	BOOL	Pulsating signal
xSawtoothRise	BOOL	Rising sawtooth
xSawtoothFall	BOOL	Falling sawtooth
<b>Input/Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bFadeValue	BYTE	Scene value
<b>Input / Output Parameters:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	-	-
<b>Graphical Illustration:</b>		
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center;">FbFadeGenerator</p> <ul style="list-style-type: none"> <li>-xEnable</li> <li>-tPeriod</li> <li>-bMaximumValue</li> <li>-xTriangle</li> <li>-xSquare</li> <li>-xSawtoothRise</li> <li>-xSawtoothFall</li> <li>-bFadeValue ▶</li> </ul> </div>		

**Function Description:**

A light scene can be generated using the **FbFadeGenerator** function block. The function block is activated via the "**xEnable**" variable.

The "**tPeriod**" input defines the duration of the light scene.

The "**bMaximumValue**" defines the maximum achievable value for the light scene.

If one of the following variables is set to TRUE, the corresponding function is generated:

1. "**xTriangle**" – Triangle function
2. "**xSquare**" – Pulsating signal
3. "**xSawtoothRise**" – Rising sawtooth
4. "**xSawtoothFall**" – Falling sawtooth.

The light scene is saved in the "**bFadeValue**" variable.



## 1.5 Cross Fade Sequence (FbColourCrossFader)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbColourCrossFader	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
xEnable	BOOL	Activation of the fade sequence
tFadeTime	TIME	Delay time Minimum: 1 s Default setting: 1 s
tHoldTime	TIME	Hold time for the recalled color Minimum: 1 s Default setting: 2 s
xToAndFro	BOOL	Rising/Falling fade sequence
iNumberOfColours	INT	Number of fade sequence colors Value range = 2 – 10 % Default setting: 10
typColour_1	<a href="#">typRGB</a>	1. Color
typColour_2	<a href="#">typRGB</a>	2. Color
typColour_3	<a href="#">typRGB</a>	3. Color
typColour_4	<a href="#">typRGB</a>	4. Color
typColour_5	<a href="#">typRGB</a>	5. Color
typColour_6	<a href="#">typRGB</a>	6. Color
typColour_7	<a href="#">typRGB</a>	7. Color
typColour_8	<a href="#">typRGB</a>	8. Color
typColour_9	<a href="#">typRGB</a>	9. Color
typColour_10	<a href="#">typRGB</a>	10. Color
<b>Input/Output Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
typRGB	<a href="#">typRGB</a>	Current color in the RGB color space
<b>Input / Output Parameters:</b>	<b>Data Type:</b>	<b>Comment:</b>
iIndex	INT-	Current color index

<b>Graphical Illustration:</b>	
<b>Function Description:</b>	
<p>A cross fade sequence can be generated using the <b>FbCrossFader</b> function block. The sequence is activated via the "<b>xEnable</b>" input.</p> <p>Cross fading between the sequences is defined by the "<b>tFadeTime</b>" delay time.</p> <p>The hold time of the recalled color is assigned at the "<b>tHoldTime</b>".</p> <p>The fade sequence colors can be configured via the "<b>typColour_1</b>" to "<b>typColour_10</b>" inputs.</p> <p>The number of fade sequence colors is defined at the "<b>iNumberOfColours</b>" input.</p> <p>A TRUE signal at the "<b>xToAndFro</b>" input activates a cross fade sequence that runs continuously back and forth. A FALSE must be configured at the input if the fade sequence is to start over from the beginning when a maximum number of fade sequence colors is reached.</p> <p>The color is displayed in the "<b>typRGB</b>" variable.</p> <p>The current color index is displayed at the "<b>iIndex</b>" output.</p>	

## 1.6 Chaser (FbChaser)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbChaser	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>		
<b>Data Type:</b>	<b>Comment:</b>	
xEnable	BOOL	Enables the function block.
xPause	BOOL	Stop chaser.
bChaserValue	BYTE	Value of a chaser Default setting: 255
iStartChannel	INT	Starting channel Minimum: 1 Default setting: 1
iEndChannel	INT	End channel Minimum: 2 Default setting: MAX_CHASER_CH
iOffset	INT	Increment Minimum: 1 Default: 1
tHoldTime	TIME	Hold time for the recalled color Minimum: 50 ms Default setting: 500 ms
<b>Input/Output Parameter:</b>		
<b>Data Type:</b>	<b>Comment:</b>	
abChaserChannel	ARRAY [1.. MAX_CHASER_CH] of BYTE	Chaser channel array MAX_CHASER_CH=50
<b>Input / Output Parameters:</b>		
<b>Data Type:</b>	<b>Comment:</b>	
iChannel	INT	Current chaser channel index
<b>Graphical Illustration:</b>		

**Function Description:**

The **FbChaser** function block copies the chaser value for a channel (A) to a different chase (B) for a given number of chase channels. The value for channel (A) is then reset to zero. A chaser effect can be created using this function.

The function block is activated via the "**xEnable**" variable. The chaser can be stopped using the "**xPause**" variable.

The chaser value to be copied is configured at the "**bChaserValue**" input.

The chaser channel for which the copying process is to be started is assigned at the "**iStartChannel**" input. Copying of the chaser value is ended at the "**iEndChannel**" channel. The "**iOffset**" variable defines the increment for copying to a different channel.

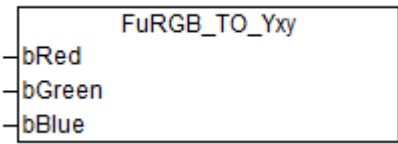
The "**tDelay**" delay period indicates the delay or waiting period between each step.

Using a rising edge at the "**xReset**" input, the contents of the "**abChaserChannel**" array can be deleted.

The current chaser channel index is displayed at the "**iChannel**" output.

## 2 Color Space

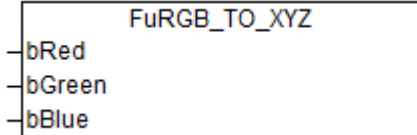
### 2.1 RGB in Yxy Color Space (CIE 1931) (FuRGB\_TO\_Yxy)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_Yxy	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typYxy</a>	CIE Yxy color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function block converts an RGB color space into a CIE Yxy color space.		

## 2.2 Yxy Color Space (CIE 1931) to RGB (FuYxy\_TO\_RGB)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuYxy_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rLuminance_Y	REAL	CIE luminance
rCoordinate_x	REAL	CIE color value x
rCoordinate_y	REAL	CIE color value y
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
<b>Function Description:</b>		
The function block converts a CIE Yxy color space into an RGB color space.		

## 2.3 RGB to CIE XYZ Color Space (FuRGB\_TO\_XYZ)

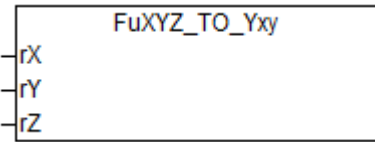
WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_XYZ	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typXYZ</a>	CIE XYZ color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function block converts an RGB color space into a CIE XYZ color space.		



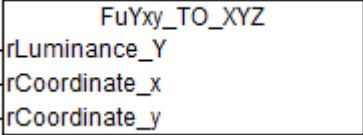
## 2.4 CIE XYZ Color Space to RGB (FuXYZ\_TO\_RGB)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuXYZ_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rX	REAL	CIE color value X
rY	REAL	CIE color value Y
rZ	REAL	CIE color value Z
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
<b>Function Description:</b>		
The function block converts a CIE XYZ color space into an RGB color space.		

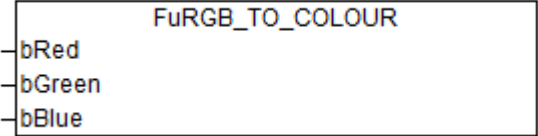
## 2.5 CIE XYZ to Yxy Color Space (CIE 1931) (FuXYZ\_TO\_Yxy)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuXYZ_TO_Yxy	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rX	REAL	CIE color value X
rY	REAL	CIE color value Y
rZ	REAL	CIE color value Z
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typYxy</a>	CIE Yxy color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function block converts a CIE XYZ color space into an CIE Yxy color space.		

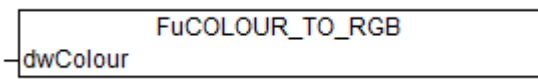
## 2.6 Yxy (CIE 1931) to CIE XYZ Color Space (FuYxy\_TO\_XYZ)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuYxy_TO_XYZ	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rLuminance_Y	REAL	CIE luminance
rCoordinate_x	REAL	CIE color value x
rCoordinate_y	REAL	CIE color value y
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
	<a href="#">typXYZ</a>	CIE XYZ color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function block converts a CIE Yxy color space into a CIE XYZ color space.		

## 2.7 RGB to CODESYS Color Format (FuRGB\_TO\_COLOUR)


WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_COLOUR	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	DWORD	CODESYS color format
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
<p>The function converts RGB values into the CODESYS color format. The return value is entered in hexadecimal notation in the order B (Blue) G (Green) R (Red). Yellow, for example, in this form has the value 16#00FFFF and white the value 16#FFFFFF.</p>		

## 2.8 CODESYS Color Format to RGB (FuCOLOUR\_TO\_RGB)

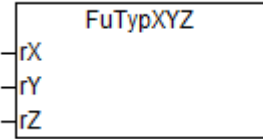
WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuCOLOUR_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD	CODESYS color format
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function converts the CODESYS color format into RGB values. The return value is of type "typRGB".		

## 3 General Functions

### 3.1 Value Input typRGB (FuTypRGB)

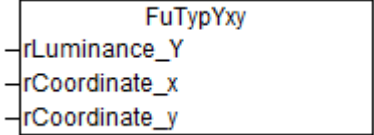
WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuTypRGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function returns RGB values as type "typRGB".		

### 3.2 Value Input typXYZ (FuTypXYZ)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuTypXYZ	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rX	REAL	CIE color value X
rY	REAL	CIE color value Y
rZ	REAL	CIE color value Z
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typXYZ</a>	CIE XYZ color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function returns CIE XYZ values as type "typXYZ".		

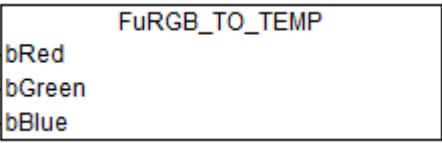


### 3.3 Value Input typYxy (FuTypYxy)

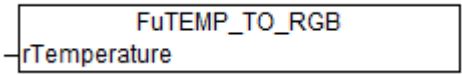
WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuTypYxy	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rLuminance_Y	REAL	CIE luminance
rCoordinate_x	REAL	CIE color value x
rCoordinate_y	REAL	CIE color value y
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typYxy</a>	CIE Yxy color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function returns CIE Yxy values as type "typYxy".		

## 4 Color Temperature

### 4.1 RGB to Color Temperature (FuRGB\_TO\_TEMP)

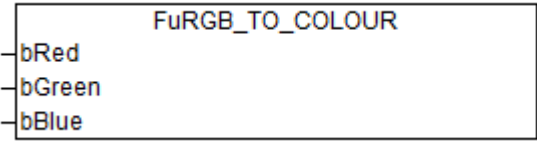
WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_TEMP	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>		
	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>		
	<b>Data Type:</b>	<b>Comment:</b>
-	REAL	Color temperature [K]
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function converts an RGB color space into a color temperature in Kelvin.		

## 4.2 Color Temperature to RGB (FuTEMP\_TO\_RGB)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuTEMP_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rTemperature	REAL	Color temperature [K] Value range: 1000 K ... 40000 K
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function converts a color temperature in Kelvin into an RGB color space.		

## 5 Color Format

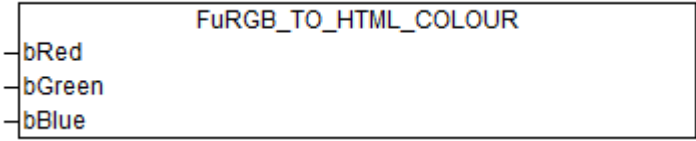
### 5.1 RGB to CODESYS Color Format (FuRGB\_TO\_COLOUR)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_COLOUR	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	DWORD	CODESYS color format
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
The function converts RGB values into the CODESYS color format. The return value is entered in hexadecimal notation in the order B (Blue), G (Green) and R (Red). Yellow, for example, in this notation has the value 16#00FFFF.		

## 5.2 CODESYS Color Format to RGB (FuCOLOUR\_TO\_RGB)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuCOLOUR_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD	CODESYS color format
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
<b>Function Description:</b>		
The function converts the CODESYS color format into RGB values. The return value is of type "typRGB".		

## 5.3 RGB to HTML Color Format (FuRGB\_TO\_HTML\_COLOUR)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuRGB_TO_HTML_COLOUR	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
bRed	BYTE	Red percentage
bGreen	BYTE	Green percentage
bBlue	BYTE	Blue percentage
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	DWORD	CODESYS color format
<b>Graphical Illustration:</b>		
		
<b>Function Description:</b>		
<p>The function converts RGB values into the HTML color format. The return value is entered in hexadecimal notation in the order R (Red), G (Green) and B (Blue). Yellow, for example, in this notation has the value 16#FFFF00.</p>		

## 5.4 HTML Color Format to RGB (FuHTML\_COLOUR\_TO\_RGB)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FuHTML_COLOUR_TO_RGB	
<b>Type:</b>	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Library used:</b>	Standard.lib	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
dwColour	DWORD	CODESYS color format
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
-	<a href="#">typRGB</a>	RGB color space
<b>Graphical Illustration:</b>		
<b>Function Description:</b>		
The function converts the HTML color format into RGB values.		



## 6 CCT Control

### 6.1 Correlated Color Temperature Control (FbCCT\_control)

WAGO-I/O-PRO V2.3 Library Elements		
<b>Category:</b>	Building technology	
<b>Name:</b>	FbCCT_control	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of library:</b>	ColourConverter_01.lib	
<b>Applicable to:</b>	See Release Note	
<b>Input Parameter:</b>	<b>Data Type:</b>	<b>Comment:</b>
rCCT	REAL	Color temperature in Kelvin
rDimmValue	REAL	Dimming factor
<b>Return Value:</b>	<b>Data Type:</b>	<b>Comment:</b>
rDimValueWarmWhite	REAL	Calculated WarmWhite percentage
rDimValueCoolWhite	REAL	Calculated CoolWhite percentage
<b>Graphical Illustration:</b>		
<b>Function Description:</b>		
<p>The function calculates the composition of the required color temperature from two color percentages based on the “<b>rCCT</b>” input value (color temperature in Kelvin) and the “<b>rDimmValue</b>” input value if available.</p> <p>Outputs are the dimming factor of the WarmWhite percentage “<b>rDimValueWarmWhite</b>” and the dimming factor of the CoolWhite percentage “<b>rDimValueCoolWhite</b>”.</p>		
<b>Note:</b>		
<p>The value pairs used for the calculation are listed in Appendix 8.1. The value pairs are created as a global constant and can be shaded (overwritten) and adjusted according to the requirements and light source. “<b>bWarmWhite</b>” designates the percentage of the warm white and “<b>bCoolWhite</b>” the percentage of the cool white.</p>		

## 7 Data Types

### 7.1 RGB Color Space (typRGB)

WAGO-I/O-PRO Library Elements	
<b>Category:</b>	Building technology
<b>Name:</b>	typRGB
<b>Type:</b>	Data type <input checked="" type="checkbox"/> Enumeration <input type="checkbox"/>
<b>Applicable to:</b>	See Release Note
<b>Declaration:</b>	
<pre> TYPE typRGB: STRUCT     bRed          : BYTE;     bGreen        : BYTE;     bBlue         : BYTE; END_STRUCT END_TYPE </pre>	

### 7.2 CIE Yxy Coordinates (typYxy)

WAGO-I/O-PRO Library Elements	
<b>Category:</b>	Building technology
<b>Name:</b>	typYxy
<b>Type:</b>	Data type <input checked="" type="checkbox"/> Enumeration <input type="checkbox"/>
<b>Applicable to:</b>	See Release Note
<b>Declaration:</b>	
<pre> TYPE typYxy: STRUCT     rLuminance_Y   : REAL;     rCoordinate_x   : REAL;     rCoordinate_y   : REAL; END_STRUCT END_TYPE </pre>	

## 7.3 CIE XYZ Coordinates (typXYZ)

WAGO-I/O-PRO Library Elements	
<b>Category:</b>	Building technology
<b>Name:</b>	typXYZ
<b>Type:</b>	Data type <input checked="" type="checkbox"/> Enumeration <input type="checkbox"/>
<b>Applicable to:</b>	See Release Note
<b>Declaration:</b>	
TYPE typXYZ: STRUCT rX              : REAL; rY              : REAL; rZ              : REAL; END_STRUCT END_TYPE	

## 8 Appendix

### 8.1 Color Temperature and Dimming Values (typWarmCoolWhite)

<b>WAGO-I/O-PRO Library Elements</b>		
<b>Category:</b>	Building technology	
<b>Name:</b>	typWarmCoolWhite	
<b>Type:</b>	Data type <input checked="" type="checkbox"/>	Enumeration <input type="checkbox"/>
<b>Applicable to:</b>	See Release Note	
<b>Declaration:</b>		
<pre> TYPE typWarmCoolWhite : STRUCT     rCCT          : REAL; (* color temperature in Kelvin *)     bWarmWhite   : BYTE; (* dimming value warm white *)     bCoolWhite   : BYTE; (* dimming value cool white *) END_STRUCT END_TYPE  (rCCT := 2700, bWarmWhite := 100, bCoolWhite := 0), (rCCT := 2717, bWarmWhite := 99, bCoolWhite := 1), (rCCT := 2735, bWarmWhite := 98, bCoolWhite := 2), (rCCT := 2753, bWarmWhite := 97, bCoolWhite := 3), (rCCT := 2771, bWarmWhite := 96, bCoolWhite := 4), (rCCT := 2789, bWarmWhite := 95, bCoolWhite := 5), (rCCT := 2808, bWarmWhite := 94, bCoolWhite := 6), (rCCT := 2827, bWarmWhite := 93, bCoolWhite := 7), (rCCT := 2846, bWarmWhite := 92, bCoolWhite := 8), (rCCT := 2866, bWarmWhite := 91, bCoolWhite := 9), (rCCT := 2885, bWarmWhite := 90, bCoolWhite := 10), (rCCT := 2905, bWarmWhite := 89, bCoolWhite := 11), (rCCT := 2925, bWarmWhite := 88, bCoolWhite := 12), (rCCT := 2946, bWarmWhite := 87, bCoolWhite := 13), (rCCT := 2967, bWarmWhite := 86, bCoolWhite := 14), (rCCT := 2988, bWarmWhite := 85, bCoolWhite := 15), (rCCT := 3009, bWarmWhite := 84, bCoolWhite := 16), (rCCT := 3031, bWarmWhite := 83, bCoolWhite := 17), (rCCT := 3053, bWarmWhite := 82, bCoolWhite := 18), (rCCT := 3075, bWarmWhite := 81, bCoolWhite := 19), (rCCT := 3097, bWarmWhite := 80, bCoolWhite := 20), (rCCT := 3120, bWarmWhite := 79, bCoolWhite := 21), (rCCT := 3144, bWarmWhite := 78, bCoolWhite := 22), (rCCT := 3167, bWarmWhite := 77, bCoolWhite := 23), (rCCT := 3191, bWarmWhite := 76, bCoolWhite := 24), (rCCT := 3215, bWarmWhite := 75, bCoolWhite := 25), (rCCT := 3240, bWarmWhite := 74, bCoolWhite := 26), (rCCT := 3265, bWarmWhite := 73, bCoolWhite := 27), (rCCT := 3290, bWarmWhite := 72, bCoolWhite := 28), (rCCT := 3316, bWarmWhite := 71, bCoolWhite := 29),                     </pre>		

**WAGO-I/O-PRO Library Elements**

(rCCT := 3342, bWarmWhite := 70, bCoolWhite := 30),  
(rCCT := 3369, bWarmWhite := 69, bCoolWhite := 31),  
(rCCT := 3395, bWarmWhite := 68, bCoolWhite := 32),  
(rCCT := 3423, bWarmWhite := 67, bCoolWhite := 33),  
(rCCT := 3450, bWarmWhite := 66, bCoolWhite := 34),  
(rCCT := 3478, bWarmWhite := 65, bCoolWhite := 35),  
(rCCT := 3507, bWarmWhite := 64, bCoolWhite := 36),  
(rCCT := 3536, bWarmWhite := 63, bCoolWhite := 37),  
(rCCT := 3565, bWarmWhite := 62, bCoolWhite := 38),  
(rCCT := 3595, bWarmWhite := 61, bCoolWhite := 39),  
(rCCT := 3625, bWarmWhite := 60, bCoolWhite := 40),  
(rCCT := 3656, bWarmWhite := 59, bCoolWhite := 41),  
(rCCT := 3687, bWarmWhite := 58, bCoolWhite := 42),  
(rCCT := 3718, bWarmWhite := 57, bCoolWhite := 43),  
(rCCT := 3750, bWarmWhite := 56, bCoolWhite := 44),  
(rCCT := 3783, bWarmWhite := 55, bCoolWhite := 45),  
(rCCT := 3816, bWarmWhite := 54, bCoolWhite := 46),  
(rCCT := 3849, bWarmWhite := 53, bCoolWhite := 47),  
(rCCT := 3883, bWarmWhite := 52, bCoolWhite := 48),  
(rCCT := 3918, bWarmWhite := 51, bCoolWhite := 49),  
(rCCT := 3953, bWarmWhite := 50, bCoolWhite := 50),  
(rCCT := 3988, bWarmWhite := 49, bCoolWhite := 51),  
(rCCT := 4024, bWarmWhite := 48, bCoolWhite := 52),  
(rCCT := 4061, bWarmWhite := 47, bCoolWhite := 53),  
(rCCT := 4098, bWarmWhite := 46, bCoolWhite := 54),  
(rCCT := 4135, bWarmWhite := 45, bCoolWhite := 55),  
(rCCT := 4173, bWarmWhite := 44, bCoolWhite := 56),  
(rCCT := 4212, bWarmWhite := 43, bCoolWhite := 57),  
(rCCT := 4251, bWarmWhite := 42, bCoolWhite := 58),  
(rCCT := 4291, bWarmWhite := 41, bCoolWhite := 59),  
(rCCT := 4331, bWarmWhite := 40, bCoolWhite := 60),  
(rCCT := 4372, bWarmWhite := 39, bCoolWhite := 61),  
(rCCT := 4414, bWarmWhite := 38, bCoolWhite := 62),  
(rCCT := 4456, bWarmWhite := 37, bCoolWhite := 63),  
(rCCT := 4499, bWarmWhite := 36, bCoolWhite := 64),  
(rCCT := 4542, bWarmWhite := 35, bCoolWhite := 65),  
(rCCT := 4586, bWarmWhite := 34, bCoolWhite := 66),  
(rCCT := 4630, bWarmWhite := 33, bCoolWhite := 67),  
(rCCT := 4675, bWarmWhite := 32, bCoolWhite := 68),  
(rCCT := 4721, bWarmWhite := 31, bCoolWhite := 69),  
(rCCT := 4767, bWarmWhite := 30, bCoolWhite := 70),  
(rCCT := 4814, bWarmWhite := 29, bCoolWhite := 71),  
(rCCT := 4862, bWarmWhite := 28, bCoolWhite := 72),  
(rCCT := 4911, bWarmWhite := 27, bCoolWhite := 73),  
(rCCT := 4960, bWarmWhite := 26, bCoolWhite := 74),  
(rCCT := 5010, bWarmWhite := 25, bCoolWhite := 75),  
(rCCT := 5060, bWarmWhite := 24, bCoolWhite := 76),  
(rCCT := 5111, bWarmWhite := 23, bCoolWhite := 77),  
(rCCT := 5162, bWarmWhite := 22, bCoolWhite := 78),  
(rCCT := 5215, bWarmWhite := 21, bCoolWhite := 79),  
(rCCT := 5268, bWarmWhite := 20, bCoolWhite := 80),  
(rCCT := 5321, bWarmWhite := 19, bCoolWhite := 81),  
(rCCT := 5376, bWarmWhite := 18, bCoolWhite := 82),

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(rCCT := 5431, bWarmWhite := 17, bCoolWhite := 83),  
(rCCT := 5488, bWarmWhite := 16, bCoolWhite := 84),  
(rCCT := 5545, bWarmWhite := 15, bCoolWhite := 85),  
(rCCT := 5603, bWarmWhite := 14, bCoolWhite := 86),  
(rCCT := 5662, bWarmWhite := 13, bCoolWhite := 87),  
(rCCT := 5721, bWarmWhite := 12, bCoolWhite := 88),  
(rCCT := 5781, bWarmWhite := 11, bCoolWhite := 89),  
(rCCT := 5842, bWarmWhite := 10, bCoolWhite := 90),  
(rCCT := 5903, bWarmWhite := 9, bCoolWhite := 91),  
(rCCT := 5966, bWarmWhite := 8, bCoolWhite := 92),  
(rCCT := 6029, bWarmWhite := 7, bCoolWhite := 93),  
(rCCT := 6093, bWarmWhite := 6, bCoolWhite := 94),  
(rCCT := 6158, bWarmWhite := 5, bCoolWhite := 95),  
(rCCT := 6224, bWarmWhite := 4, bCoolWhite := 96),  
(rCCT := 6292, bWarmWhite := 3, bCoolWhite := 97),  
(rCCT := 6360, bWarmWhite := 2, bCoolWhite := 98),  
(rCCT := 6429, bWarmWhite := 1, bCoolWhite := 99),  
(rCCT := 6500, bWarmWhite := 0, bCoolWhite := 100);

# WE! INNOVATE!

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